

$$\vec{a} + \vec{b} = \vec{c}$$

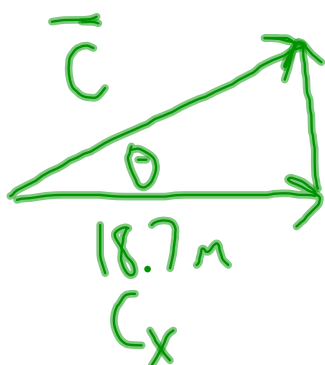
$$\vec{a}_x + \vec{b}_x = \vec{c}_x$$

$$\vec{a}_y + \vec{b}_y = \vec{c}_y$$

$$a \cos \theta_1 + b \cos \theta_2 = c_x \quad a \sin \theta_1 + b \sin \theta_2 = c_y$$

$$(10\text{m}) \cos(49^\circ) + (13\text{m}) \cos(21^\circ) = c_x$$

$$c_x = 18.7\text{m}$$



$$c^2 = c_x^2 + c_y^2$$

$$c = 22.3\text{m}$$

$$(10\text{m}) \sin(49^\circ) + (13\text{m}) \sin(21^\circ) = c_y$$

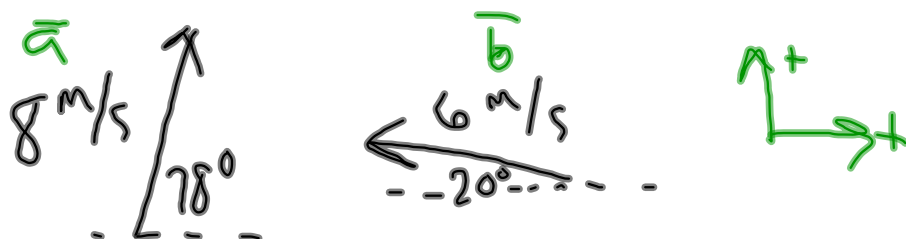
$$c_y = 12.2\text{m}$$

$$\tan \theta = \frac{c_y}{c_x}$$

$$\theta = \tan^{-1}\left(\frac{c_y}{c_x}\right)$$

$$= 33^\circ$$

$\underline{22.3 \text{ m}}$   $\underline{\text{ @ } 33^\circ}$   $\underline{\text{ north of east }}$   
 $\downarrow$   $\downarrow$   $\downarrow$   
 $\rightarrow$  units  $\rightarrow$  direction  
 $\rightarrow$  magnitude  $\rightarrow$  angle



$$\vec{a} + \vec{b} = \vec{c}$$

$$\vec{a}_x + \vec{b}_x = \vec{c}_x$$

$$a \cos(\theta_1) + b \cos(\theta_2) = c_x$$

$$(8 \text{ m/s}) \cos(78^\circ) + (-6 \text{ m/s}) \cos(20^\circ) = c_x$$

$$1.66 \text{ m/s} - 5.64 \text{ m/s} = c_x$$

$$c_x = -3.98 \text{ m/s}$$

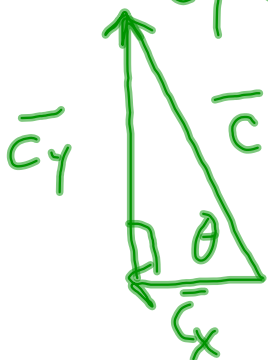
$$\vec{a}_y + \vec{b}_y = \vec{c}_y$$

$$a \sin(\theta_1) + b \sin(\theta_2) = c_y$$

$$(8 \text{ m/s}) \sin(78^\circ) + (6 \text{ m/s}) \sin(20^\circ) = c_y$$

$$7.83 \text{ m/s} + 2.05 \text{ m/s} = c_y$$

$$c_y = 9.85 \text{ m/s}$$

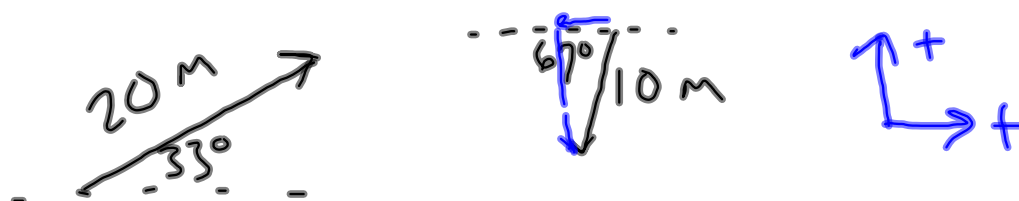


$$c^2 = c_x^2 + c_y^2$$

$$c = 10.6 \text{ m/s}$$

$$\theta = \tan^{-1}\left(\frac{c_y}{c_x}\right)$$

$$= 68^\circ$$



$$a_x = 16.8 \text{ m}$$

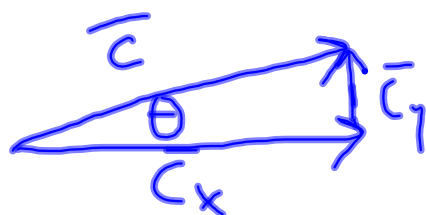
$$a_y = 10.9 \text{ m}$$

$$b_x = -3.91 \text{ m}$$

$$b_y = -9.20 \text{ m}$$

$$c_x = 12.8 \text{ m}$$

$$c_y = 1.7 \text{ m}$$



$$c = 13.0 \text{ m}$$

$$\theta = 7^\circ \text{ N of } \vec{E}$$

$$\vec{c} = 13.0 \text{ m @ } 7^\circ \text{ N of } \vec{E}$$



$$a_x = 9.1 \text{ m/s}$$

$$b_x = 10.3 \text{ m/s}$$

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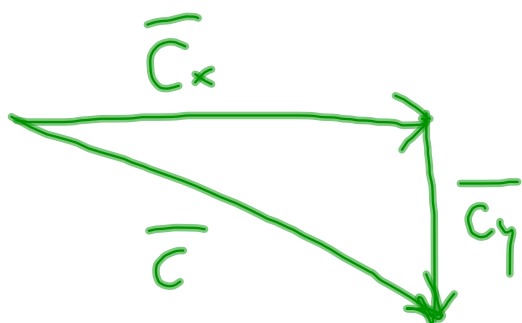

$$c_x = 19.4 \text{ m/s}$$

$$a_y = 7.9 \text{ m/s}$$

$$b_y = -14.8 \text{ m/s}$$

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$$c_y = -6.9 \text{ m/s}$$



$$C = 20.6 \text{ m/s}$$

$$\theta = 19^\circ$$

S of E

$$\vec{C} = 20.6 \text{ m/s @ } 19^\circ \text{ S of E}$$

Displacement:

$$\Delta x = x_f - x_i$$

↙ final position      ↘ initial position

